IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	: Gupta et al.	Art Unit	: 2814
Serial No.	: 10/758,478	Examiner	: Abul Kalam
Filed	: January 14, 2004	Conf. No.	: 5829
Title	: DEPOSITION OF CONDUCTING POLYMERS		

Commissioner for Patents
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PRE-APPEAL BRIEF REQUEST FOR REVIEW

This brief is filed in response to deficiencies in the Final Office Action of August 16, 2007 ("Office Action"), and is hereby submitted with the Notice of Appeal. The applicants request the Panel to review the omissions of teachings required to establish a *prima facie* rejection. All rights to address additional matters on appeal in any subsequent appeal brief are hereby reserved.

Claims 14-25, 27 and 29-31 are pending, of which claims 14 and 30 are independent. Claims 14, 16-20 and 29 are rejected under 35 U.S.C. §102(e) as allegedly being anticipated by Takano et al. (U.S. Pub. No. 2003/0176005) ("Takano"). Claims 14, 16-23 and 27 are rejected under 35 U.S.C. §103(a) as allegedly being obvious over Seki et al. (U.S. Pub. No. 2004/0144975) ("Seki"). Claims 15 and 25 are rejected under 35 U.S.C. §103(a) as allegedly being obvious over Seki in view of Sellinger (U.S. Pat. No. 6,861,091). Claim 24 is rejected under 35 U.S.C. §103(a) as allegedly being obvious over Seki in view of Mueller et al. (U.S. Pat. No. 6,316,786) and Heeney (U.S. Pub. No. 2003/0047719). Finally, claims 30 and 31 are rejected under 35 U.S.C. §103(a) as allegedly being obvious over Takano.

REMARKS

Claims 14 and 30 are directed to methods of fabricating an organic electronic device, said device comprising, in relevant part, "depositing a precipitation agent upon said lower electrode layer; and depositing an organic material upon said precipitation agent after depositing said precipitation agent . . . ."

Takano and Seki teach methods of "dissolving" the hole injection/transport material in a "solvent" and then "evaporating the solvent" to leave behind the dried material. Takano teaches that "the first composition containing a hole injection/transport layer forming material is ejected onto each electrode surface 511*a* by the functional liquid droplet ejecting method." [0122]. This first composition may be obtained "by *dissolving a mixture* of [PEDOT and PSS] in a polar solvent." [0124]. Next, "the first composition ejected *is subjected to drying and heating treatments for evaporating the polar solvent* contained in the first composition . . . . When the drying treatment is performed, *there occurs evaporation of the polar solvent* . . . ." [0126].

Seki, in similar fashion, teaches "[t]he solvent forms the composition . . . by mixing with the organic conductive or semiconductive material." [0084]. "The organic conductive material . . . can be *dissolved or dispersed* in the solvent . . . ." [0103]. The *solvent is then evaporated to leave behind the dried functional material.* [0113] – [0117].

1. Both Takano and Seki Fail to Teach the Use of a "Precipitating Agent"

Rejection under §102(e) is improper for at least the reasons that Takano and Seki teach a different method of forming a dried functional material on a substrate than the claimed method, and use different materials that perform different functions. The methods of Takano and Seki do not use a precipitation agent. This conclusion is evident from definitions of technical terms and the teachings of the references and the application.

Applicants first direct the Panel to definitions of the terms "precipitation" and "dissolve" (Amendment in Reply to Action of February 1, 2007, 5-6). Note also that "solvent" means "1: a usu[ally] liquid substance capable of dissolving or dispersing one or more other substances" (Merriam-Webster's Collegiate Dictionary, 11th Ed., 2003).

Understanding these definitions, persons having ordinary skill in the art will recognize the differences between the methods of Takano and Seki and that of the application. For example, and as cited by the Examiner, Takano teaches "in accordance with the *evaporation*, the hole injection/transport layer forming material is concentrated for precipitation (¶[0126])." Office Action, 10. Recall, however, that the functional material is first dissolved in the polar solvent (see above). It is then the *evaporation* of the solvent which causes ("in accordance with") the "concentration" of the mixture. This "concentration," in turn, results in

"precipitation." Seki describes essentially the same method (see excerpts above). Thus, Takano and Seki teach depositing a single solution consisting of a mixture of the solvent and the active material, and then drying off the solvent to form a layer of active material on the substrate. Precipitation—here, leaving behind a solid phase on the substrate—occurs only after sufficient removal of the solvent.

Takano and Seki fail, however, to teach the use of a precipitation *agent*. In support of claims 14 and 30, "the precipitation agent causes the particles of the drop to become larger in size and *coalesce together* . . . thus pulling them in a direction normal to the deposition surface 310." Specification, p. 10, lines 8-12. "The precipitation agent *will modify the molecular properties of the conducting polymer solution* that follows it . . . ." *Id.* p. 23, lines 21-23. In other words, the precipitation agent causes the conducting polymer to precipitate *in solution*, fall out of solution, and deposit as a solid on the substrate. Importantly, this precipitation, since it is *induced by the agent*, does not require *evaporation* of the solvent. In contrast, Takano and Seki simply teach evaporation of the solvent until the solid phase of the material is left on the substrate. Thus, Takano and Seki fail to teach the limitation of a "precipitation agent." For at least this reason, rejection under §102(e) is improper.

The Examiner asserts that "both Takano's and Seki's polar solvents perform the same function as the precipitation agent claimed by the Applicant" (Office Action, p. 10-11). This characterization is inaccurate in light of the definitions and teachings recited above. Again, in Takano and Seki, the solvent dissolves the functional material to form a mixture. There is no teaching of a solid phase at this point. A solid phase forms on the substrate only after sufficient evaporation of the solvent. In contrast, in claims 14 and 30, the precipitation agent is first deposited on the substrate, followed by deposition of the active material. It is the mixing of the precipitation agent with the active material which "causes the particles [of the active material] of the drop to become large in size" *and fall out of solution and onto the substrate* ("pulling them in a direction normal to the deposition surface"). The function of the precipitation agent, therefore, cannot be equated with the function of the polar solvent because the former causes *precipitation of,* while the latter *dissolves*, the functional material.

Finally, the Examiner argues that Takano teaches "precipitation" because the "evaporation . . . produces a separable solid phase." *Id.*, 11. This argument misses the point,

however, since Takano does not employ a precipitation *agent*. Any "precipitation" in Takano and Seki occurs only after sufficient evaporation of the solvent, not by the use of any precipitation *agent*.

For at least these reasons, rejection under §102(e) remains improper.

2. Application of the Teachings of Takano and Seki to this Application Would Result in an Inoperable Device.

Independent claims 14 and 30 disclose "depositing an organic material upon said precipitation agent *after depositing said precipitation agent*." These claims, and corresponding dependent claims, have been rejected under §103(a) as being obvious over either Takana or Seki, in combination with other references as noted above.

This rejection is based, in critical part, on the argument that "any order of performing process steps or mixing ingredients is prima facie obvious in the absence of new or unexpected results" (*Id.*, 5, 12). The Examiner argues that that Takano teaches "a plurality of separate operations" (*Id.*, 9), and that "since each droplet comprises both and [sic] organic layer and a precipitation agent," that this limitation is anticipated by Takano (*Id.*, 11).

First, the applicants remind the Panel that, as explained above, neither Takano nor Seki teach the use of a precipitation agent. Instead, they teach depositing a mixture of the active material and a solvent, and drying off the solvent to leave behind the solid active material. Because the solvent acts to dissolve the active material, it is improper to equate it with a "precipitation agent."

Moreover, the deposition method argued by the Examiner could not even be performed using the materials of the application. Since the precipitation agent causes particles of the active material to coalesce, mixing the precipitation agent with active material prior to depositing them, as in the manner of Takano and Seki, would result in precipitation occurring *before* the droplet is deposited onto the substrate. The Examiner fails to show how such precipitation of solids before being depositing on the substrate would yield the intended device, which is made by first depositing the precipitation agent and then the active material, so that precipitation occurs on the substrate. Worse, applying the teachings of Takano and Seki argued by the Examiner would result in an inoperable method because, for example, ejection nozzles, feed lines, etc. would be

clogged by the precipitated solid material and would not function properly. Therefore, the use of a mixture of active material and solvent in Takano and Seki strongly teaches away from, and is incompatible with, the use of a precipitation agent as claimed. The Examiner's final argument thus fails to support a *prima facie* case of obviousness and should be withdrawn.

3. All Additional Rejections Remain Improper Because they are Based on Takano and Seki, which Fail to Teach or Suggest the Relevant Claim Limitations.

As stated in the previous response, the remaining rejections under §103(a) all assert a teaching from Takano or Seki of a "precipitation agent." Amendment in Reply of Action of February 1, 2007, p. 7. Because these references in fact fail to teach or suggest this limitation, these rejections remain improper.

Conclusion

For at least the reasons provided herein, applicants submit that the outstanding office action of August 16, 2007 fails to present a *prima facie* case of anticipation or obviousness of the pending claims, and that the Examiner's arguments are clear error. Applicants request that these rejections be withdrawn, and request formal notice of allowance of all pending claims.

Respectfully submitted,

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